

**HEALTH AND SAFETY PLAN
REVISION 01**

**ASARCO EAST HELENA LEAD SMELTER
EAST HELENA, MONTANA**

Prepared for:

**U. S. ENVIRONMENTAL PROTECTION AGENCY (EPA), REGION 8
1595 WYNKOOP STREET
DENVER, COLORADO 80202**

Contract No.	:	EP-W-07-019
Task Order No.	:	0014
Date Prepared	:	September 22, 2008
Prepared by	:	Tetra Tech EM Inc. (Tetra Tech) (Christopher Reynolds)
Tetra Tech Task Order Manager:		David Harr
Telephone No.	:	303-312-8848
Task Order Contracting Officer's Representative	:	Linda Jacobson
Telephone No.	:	303-312-6503



Tetra Tech EM Inc.

518 17th Street, Suite 900 ♦ Denver, CO 80202 ♦ (303) 312-8800 ♦ FAX (303) 295-2818

September 22, 2008

Ms. Linda Jacobson
Task Order Contracting Officer's Representative
U.S. Environmental Protection Agency
1595 Wynkoop Street
Denver, Colorado 80202

**Subject: Health and Safety Plan, Revision 01
ASARCO East Helena Lead Smelter, CAMU Cell 2
Task Order 0014, Contract Number EP-W-07-019**

Dear Ms. Jacobson:

Tetra Tech EM Inc. (Tetra Tech) is pleased to submit health and safety plan (HASP) revision 01 for the ASARCO East Helena Lead Smelter, Corrective Action Management Unit (CAMU) Cell 2. This HASP has been developed for use during field oversight that includes demolition of large structures and placement of waste material at CAMU Cell 2.

In addition, this revised HASP supplements the site-specific HASP for demolition and CAMU Cell 2 construction prepared by URS Corporation (URS 2007) and the Tetra Tech, Inc., Health and Safety Manual (Tetra Tech 1999) submitted on December 28, 2006, as part of the programmatic reporting under the REPA 4 contract.

If you have any questions or need additional information, please call me at 303-312-8848.

Sincerely,

David Harr
Task Order Manager

Enclosure

cc: Noreen Okubo, EPA Task Order Contracting Officer's Representative (Letter only)
Randy Breeden, EPA Technical Lead
Gary Sturm, Tetra Tech Task Order Technical Lead
Christopher Reynolds, Tetra Tech Task Order Technical Lead
File

References: 1. Tetra Tech, Inc. 1999. Health and Safety Plan
2. URS Corporation. 2007. Site-Specific Environmental Health & Safety Action Plan, ASARCO: 2007 Demolition and CAMU Phase 2 Project. April 2007.

CONTENTS

<u>Section</u>	<u>Page</u>
1.0 INTRODUCTION	1
2.0 HEALTH AND SAFETY PERSONNEL AND PLAN ENFORCEMENT	2
2.1 PROJECT PERSONNEL	2
2.1.1 Project Manager and Field Manager	3
2.1.2 Site Safety Coordinator	3
2.1.3 Health and Safety Representative	3
2.1.4 Tetra Tech Employees.....	3
2.2 SUBCONTRACTORS	4
2.3 VISITORS	4
2.4 HEALTH AND SAFETY PLAN ENFORCEMENT	4
3.0 SITE BACKGROUND.....	5
3.1 SITE DESCRIPTION.....	5
3.2 SITE HISTORY	5
3.3 PLANNED ACTIVITIES.....	8
4.0 SITE-SPECIFIC HAZARD EVALUATION	8
4.1 CHEMICAL HAZARDS.....	8
4.2 PHYSICAL HAZARDS.....	13
5.0 TRAINING REQUIREMENTS	13
6.0 PERSONAL PROTECTION REQUIREMENTS	15
6.1 PROTECTIVE EQUIPMENT AND CLOTHING.....	15
6.2 REASSESSMENT OF PROTECTION LEVELS.....	17
6.3 LIMITATIONS OF PROTECTIVE CLOTHING.....	17
6.4 RESPIRATOR SELECTION, USE, AND MAINTENANCE.....	18
7.0 MEDICAL SURVEILLANCE.....	20
7.1 HEALTH MONITORING REQUIREMENTS.....	21
7.2 SITE-SPECIFIC MEDICAL MONITORING.....	22
7.3 MEDICAL SUPPORT AND FOLLOW-UP REQUIREMENTS	22
8.0 ENVIRONMENTAL MONITORING AND SAMPLING	22
9.0 SITE CONTROL.....	23
9.1 ON-SITE COMMUNICATIONS.....	23
9.2 SITE CONTROL ZONES	23
9.2.1 Zone 1: Exclusion Zone	24
9.2.2 Zone 2: Decontamination Zone.....	24

CONTENTS (Continued)

<u>Section</u>	<u>Page</u>
9.2.3 Zone 3: Support Zone.....	24
9.3 SITE ACCESS CONTROL.....	24
9.4 SITE SAFETY INSPECTIONS	25
9.5 SAFE WORK PRACTICES.....	25
10.0 DECONTAMINATION.....	25
10.1 PERSONNEL DECONTAMINATION.....	25
10.2 EQUIPMENT DECONTAMINATION.....	26
10.2.1 Heavy Equipment.....	26
10.2.2 Sampling Equipment	26
11.0 EMERGENCY RESPONSE PLANNING	26
11.1 PRE-EMERGENCY PLANNING	27
11.2 PERSONNEL ROLES AND LINES OF AUTHORITY	27
11.3 EMERGENCY RECOGNITION AND PREVENTION.....	27
11.4 EVACUATION ROUTES AND PROCEDURES.....	28
11.5 EMERGENCY CONTACTS AND NOTIFICATIONS	28
11.6 HOSPITAL ROUTE DIRECTIONS.....	28
11.7 EMERGENCY MEDICAL TREATMENT PROCEDURES	28
11.8 PROTECTIVE EQUIPMENT FAILURE.....	29
11.9 FIRE OR EXPLOSION.....	29
11.10 WEATHER-RELATED EMERGENCIES	29
11.11 SPILLS OR LEAKS.....	30
11.12 EMERGENCY EQUIPMENT AND FACILITIES.....	30
11.13 REPORTING.....	30
12.0 REFERENCES	31

Appendix

A	TETRA TECH FORMS
B	SAFE WORK PRACTICES
C	RESPIRATORY HAZARD ASSESSMENT (FORM RP-2)

FIGURES


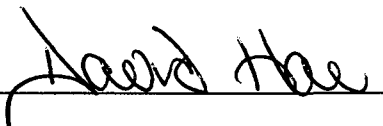
<u>Figure</u>	<u>Page</u>
3-1 SITE LOCATION	6
3-2 SITE LAYOUT MAP	7

TABLES

<u>Table</u>	<u>Page</u>
4-1 POTENTIAL CHEMICAL HAZARDS.....	10
4-2 TASK HAZARD ANALYSIS	12

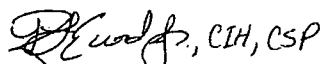
REVIEWS AND APPROVALS
CLIENT NAME: U.S. EPA
CONTRACT NO.: EP-W-07-019
ASARCO EAST HELENA LEAD SMELTER
EAST HELENA, MONTANA

We the undersigned have read and approve of the health and safety guidelines presented in this health and safety plan for on-site work activities at the ASARCO East Helena Lead Smelter site.

Name	Signature	Date
Richard L. Ecord Jr., CIH, CSP Tetra Tech EM Inc. (Tetra Tech) Health and Safety Representative		9/18/2008
David Harr Tetra Tech Task Order Manager		9.22.08

This certifies that Tetra Tech has assessed the type, risk level, and severity of hazards for the project and has selected appropriate personal protective equipment for site personnel in accordance with Occupational Safety and Health Administration Title 29 of the *Code of Federal Regulations*, Part 1910.132.

Certified by

Richard L. Ecord Jr., CIH, CSP Tetra Tech Technical Reviewer		9/18/2008
--	--	-----------

EMERGENCY INFORMATION

POST ON SITE

EMERGENCY CONTACTS AND ROUTE TO HOSPITAL

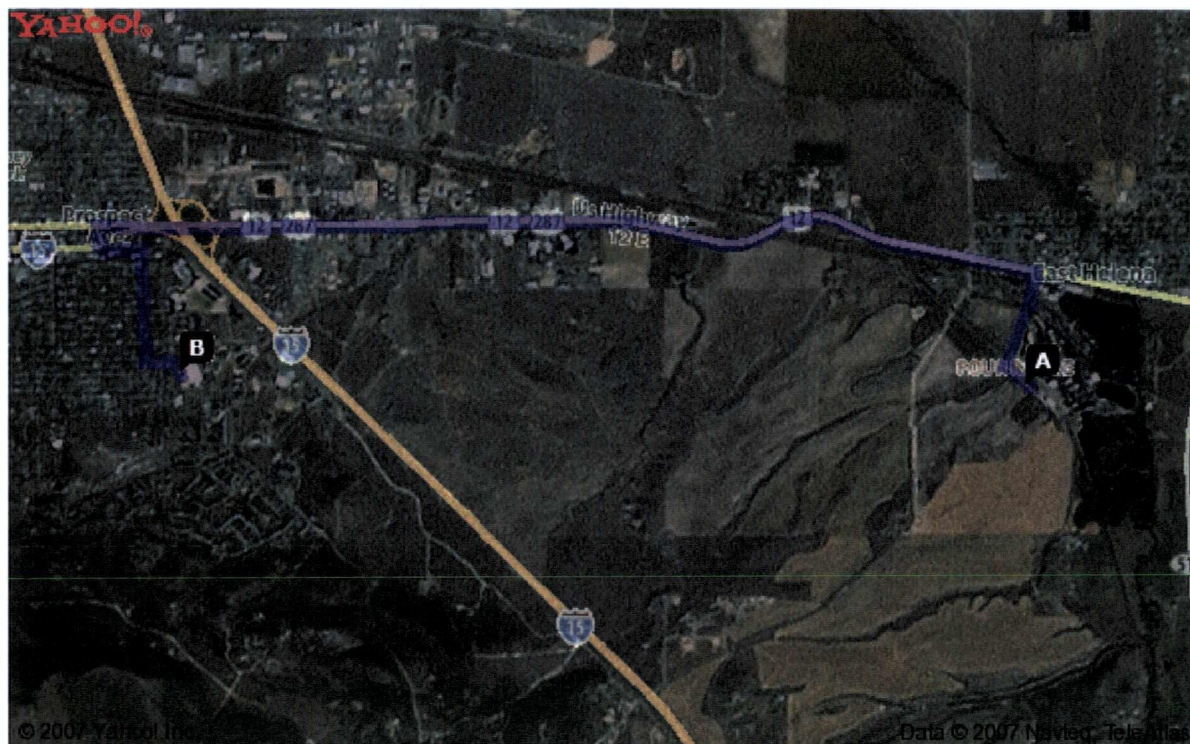
Emergency Contact	Telephone No.
U.S. Coast Guard National Response Center	(800) 424-8802
InfoTrac Chemical Monitoring System	(800) 535-5053
WorkCare	(800) 455-6155
Fire Department	911
Police Department	911
Tetra Tech EM Inc. Personnel:	
Human Resource Development: Amy Clark	(626) 470-2516
Health and Safety Representative: Richard Ecord, CIH, CSP	(404) 305-9850
Office Health and Safety Coordinator: Sandy McCann	(406) 442-5588, ext 221
Task Order Manager: David Harr	(303) 312-8848
Site Safety Coordinator: Christopher Reynolds	(406) 442-5588, ext. 232
Field Manager: Gary Sturm	(406) 442-5588, ext. 239
Client Contact:	
EPA Task Order Contracting Officer's Representative: Linda Jacobson	(303) 312-6503
EPA Technical Lead: Randall Breeden	(303) 312-6522
Medical Emergency	
Hospital Name:	Saint Peter's Hospital
Hospital Address:	2475 Broadway Helena, Montana 59601
Hospital Telephone No.:	Emergency - (406) 444-2150 General - (406) 442-2480
Ambulance Telephone No.:	911
Route to Hospital: (see next page hospital route map)	
Follow Smelter South Road West to Exit site. Turn Right on Highway 282. Turn Left on Highway 12. Turn left on North Fee Street and follow until it merges with 11 th avenue. Turn Right on N California Street. Turn Left on E Broadway Street. Enter Saint Peter's Hospital.	

Note: This sheet must be posted on site.

EMERGENCY INFORMATION

POST ON SITE

HOSPITAL ROUTE MAP



Notes:

This sheet must be posted on site.

SOURCE: MODIFIED FROM YAHOO.COM

- A ASARCO East Helena Lead Smelter site
- B Saint Peter's Hospital

1.0 INTRODUCTION

Tetra Tech EM Inc. (Tetra Tech) received Task Order (TO) No. 0014 from the U.S. Environmental Protection Agency (EPA) under Contract No. EP-W-07-019 to conduct field oversight during demolition of facility structures and loading of waste into the Corrective Action Management Unit (CAMU) Cell 2 at the ASARCO East Helena Lead Smelter in Helena, Montana. The site-specific health and safety provisions in this document have been developed for use during field oversight that includes demolition of large structures and placement of waste material at CAMU Cell 2 at the ASARCO East Helena Lead Smelter. Oversight is scheduled to occur three days per week for one to two hours per visit. This document addresses items specified under Occupational Safety and Health Administration (OSHA) Title 29 of the *Code of Federal Regulations* (CFR), Part 1910.120 (b), "Final Rule." This health and safety plan (HASP) will be available to all on-site personnel who may be exposed to hazardous on-site conditions, including Tetra Tech and subcontractor personnel participating in field oversight of CAMU Cell 2 construction, and all site visitors, including regulatory agency representatives. In addition, this HASP supplements the site-specific HASP for demolition and CAMU Cell 2 construction prepared by URS Corporation for ASARCO (URS 2007) and the Tetra Tech, Inc., Health and Safety Manual submitted on December 28, 2006, as part of the programmatic reporting under this contract (Tetra Tech 1999).

The purpose of this HASP is to define requirements and designate protocols to be followed during field oversight at the ASARCO East Helena Smelter site. All personnel on site, including Tetra Tech and subcontractor employees and site visitors, must be informed of site emergency response procedures and any potential fire, explosion, health, or safety hazards associated with on-site activities. This HASP summarizes potential hazards and defines protective measures planned for site activities.

This plan must be reviewed and approved by the Tetra Tech health and safety representative (HSR) or a designee and the Tetra Tech task order manager (see the Reviews and Approvals form after the Contents in this document). The Compliance Agreement form in Appendix A must be signed by all personnel before they enter the site. Protocols established in this HASP are based on site conditions and health and safety hazards known or anticipated to be present and on available site data. This plan is intended solely for use during proposed activities described in the corresponding site-specific work plan. Specifications herein are subject to review and revision based on actual conditions encountered in the field during site activities. Significant revisions to this plan must be approved by the Tetra Tech task order manager and

the Tetra Tech HSR. Tetra Tech employees must also follow safety requirements taught during safety training and described in the Tetra Tech, Inc., "Health and Safety Manual."

2.0 HEALTH AND SAFETY PERSONNEL AND PLAN ENFORCEMENT

This section describes responsibilities of project personnel, summarizes requirements for subcontractors and visitors who wish to enter the ASARCO East Helena Lead Smelter site, and discusses HASP enforcement.

2.1 PROJECT PERSONNEL

The following personnel and organizations are associated with planned activities at the site. The organizational structure will be reviewed and updated as necessary during the course of the project.

<u>Name/Title</u>	<u>Responsibility</u>	<u>Telephone No.</u>
Client Representative:		
Linda Jacobson	Task Order Contracting Officer's Representative	303-312-6503
Randall Breeden	Project Technical Lead	303-312-6522
Tetra Tech Personnel:		
David Harr	Task Order Manager	303-312-8848
Richard Ecord, CIH	HSR	404-305-9850
Christopher Reynolds	Site Safety Coordinator (SSC)	406-442-5588, ext. 232
Gary Sturm	Field Manager	406-442-5588, ext. 239
Subcontractors: None	Not applicable	Not applicable

The Tetra Tech task order manager, field manager, SSC, and HSR will be responsible for implementation and enforcement of the provisions of this HASP. Their duties and the expectations for Tetra Tech employees are described in the following sections.

2.1.1 Task Order Manager and Field Manager

The Tetra Tech task order manager has ultimate responsibility for ensuring implementation of the requirements set forth in this HASP. Some of this responsibility may be achieved through delegation to site-dedicated personnel that report directly to the task order manager. The task order manager shall regularly confer with site personnel regarding safety and health compliance.

The Tetra Tech field manager will oversee and direct field activities and has day-to-day responsibility for ensuring implementation of the HASP. Subcontractor compliance with the HASP shall be monitored by the field manager. The field manager will report directly to the task order manager any health and safety-related issues.

2.1.2 Site Safety Coordinator

The Tetra Tech SSC will be appointed by the task order manager and will be responsible for field implementation of tasks and procedures contained in this HASP, including air monitoring, establishing a decontamination protocol, and ensuring the signing of the Daily Tailgate Safety Meeting form (Form HST-2) and the Compliance Agreement (Form HSP-4) (see Appendix A) by all personnel working on site. The SSC will have advanced field work experience and be familiar with health and safety requirements specific to the project. The SSC will also maintain the Daily Site Log (Form SSC-1 in Appendix A).

2.1.3 Health and Safety Representative

The Tetra Tech HSR is responsible for administration of the company health and safety program. The HSR will act in an advisory capacity to task order managers and site personnel for project-specific health and safety issues. The Tetra Tech task order manager will establish a liaison between officers and representatives of EPA and the HSR on matters relating to health and safety.

2.1.4 Tetra Tech Employees

Tetra Tech employees are expected to fully participate in implementing the site HASP by obtaining necessary training, attending site safety meetings, always wearing designated personal protective equipment (PPE), complying with site safety and health rules, and advising the Tetra Tech SSC of health and safety concerns at the site.

1
 2
 3
 4
 5
 6
 7
 8
 9
 10
 11
 12
 13
 14
 15
 16
 17
 18
 19
 20
 21
 22
 23
 24
 25
 26
 27
 28
 29
 30
 31
 32
 33
 34
 35
 36
 37
 38
 39
 40
 41
 42
 43
 44
 45
 46
 47
 48
 49
 50
 51
 52
 53
 54
 55
 56
 57
 58
 59
 60
 61
 62
 63
 64
 65
 66
 67
 68
 69
 70
 71
 72
 73
 74
 75
 76
 77
 78
 79
 80
 81
 82
 83
 84
 85
 86
 87
 88
 89
 90
 91
 92
 93
 94
 95
 96
 97
 98
 99
 100
 101
 102
 103
 104
 105
 106
 107
 108
 109
 110
 111
 112
 113
 114
 115
 116
 117
 118
 119
 120
 121
 122
 123
 124
 125
 126
 127
 128
 129
 130
 131
 132
 133
 134
 135
 136
 137
 138
 139
 140
 141
 142
 143
 144
 145
 146
 147
 148
 149
 150
 151
 152
 153
 154
 155
 156
 157
 158
 159
 160
 161
 162
 163
 164
 165
 166
 167
 168
 169
 170
 171
 172
 173
 174
 175
 176
 177
 178
 179
 180
 181
 182
 183
 184
 185
 186
 187
 188
 189
 190
 191
 192
 193
 194
 195
 196
 197
 198
 199
 200
 201
 202
 203
 204
 205
 206
 207
 208
 209
 210
 211
 212
 213
 214
 215
 216
 217
 218
 219
 220
 221
 222
 223
 224
 225
 226
 227
 228
 229
 230
 231
 232
 233
 234
 235
 236
 237
 238
 239
 240
 241
 242
 243
 244
 245
 246
 247
 248
 249
 250
 251
 252
 253
 254
 255
 256
 257
 258
 259
 260
 261
 262
 263
 264
 265
 266
 267
 268
 269
 270
 271
 272
 273
 274
 275
 276
 277
 278
 279
 280
 281
 282
 283
 284
 285
 286
 287
 288
 289
 290
 291
 292
 293
 294
 295
 296
 297
 298
 299
 300
 301
 302
 303
 304
 305
 306
 307
 308
 309
 310
 311
 312
 313
 314
 315
 316
 317
 318
 319
 320
 321
 322
 323
 324
 325
 326
 327
 328
 329
 330
 331
 332
 333
 334
 335
 336
 337
 338
 339
 340
 341
 342
 343
 344
 345
 346
 347
 348
 349
 350
 351
 352
 353
 354
 355
 356
 357
 358
 359
 360
 361
 362
 363
 364
 365
 366
 367
 368
 369
 370
 371
 372
 373
 374
 375
 376
 377
 378
 379
 380
 381
 382
 383
 384
 385
 386
 387
 388
 389
 390
 391
 392
 393
 394
 395
 396
 397
 398
 399
 400
 401
 402
 403
 404
 405
 406
 407
 408
 409
 410
 411
 412
 413
 414
 415
 416
 417
 418
 419
 420
 421
 422
 423
 424
 425
 426
 427
 428
 429
 430
 431
 432
 433
 434
 435
 436
 437
 438
 439
 440
 441
 442
 443
 444
 445
 446
 447
 448
 449
 450
 451
 452
 453
 454
 455
 456
 457
 458
 459
 460
 461
 462
 463
 464
 465
 466
 467
 468
 469
 470
 471
 472
 473
 474
 475
 476
 477
 478
 479
 480
 481
 482
 483
 484
 485
 486
 487
 488
 489
 490
 491
 492
 493
 494
 495
 496
 497
 498
 499
 500
 501
 502
 503
 504
 505
 506
 507
 508
 509
 510
 511
 512
 513
 514
 515
 516
 517
 518
 519
 520
 521
 522
 523
 524
 525

[illegible][illegible][illegible][illegible][illegible][illegible][illegible]

3.0 SITE BACKGROUND

Tetra Tech has been tasked by EPA to provide oversight of field activities during the demolition of facility structures and placement of waste into CAMU Cell 2 at the ASARCO East Helena Lead Smelter in Helena, Montana. The following sections describe the ASARCO East Helena Lead Smelter site, its history, and activities planned for this project.

3.1 SITE DESCRIPTION

The portions of the facility that are scheduled for demolition this year include the three baghouses and associated flues and the acid plant and associated piping and tanks. CAMU Cell 2 was constructed on flat terrain south of the ASARCO East Helena Lead Smelter. The area has not been disturbed by activities at the lead smelter. No structures are currently present at the CAMU site. Site safety showers are present in the smelter.

3.2 SITE HISTORY

The ASARCO East Helena Lead Smelter started operation in the 1890s and was closed in 2003. The smelter used a series of furnaces to convert lead ore into lead bullion. The facilities and structures at the smelter are currently being demolished and the demolition debris will be placed in the CAMU Phase 2 cell. The CAMU Phase 2 cell will contain soil from the plant site soil and demolition debris generated through actions taken to comply with the Montana Consent Decree (CDV-2004-212) and the RCRA Consent Decree (CV98-3-H-CCL) (Hydrometrics 2007). Past site activities have resulted in the contamination of soil with heavy metals including arsenic, cadmium, and lead. Also, asbestos was used to insulate many pipes and structures at the smelter.

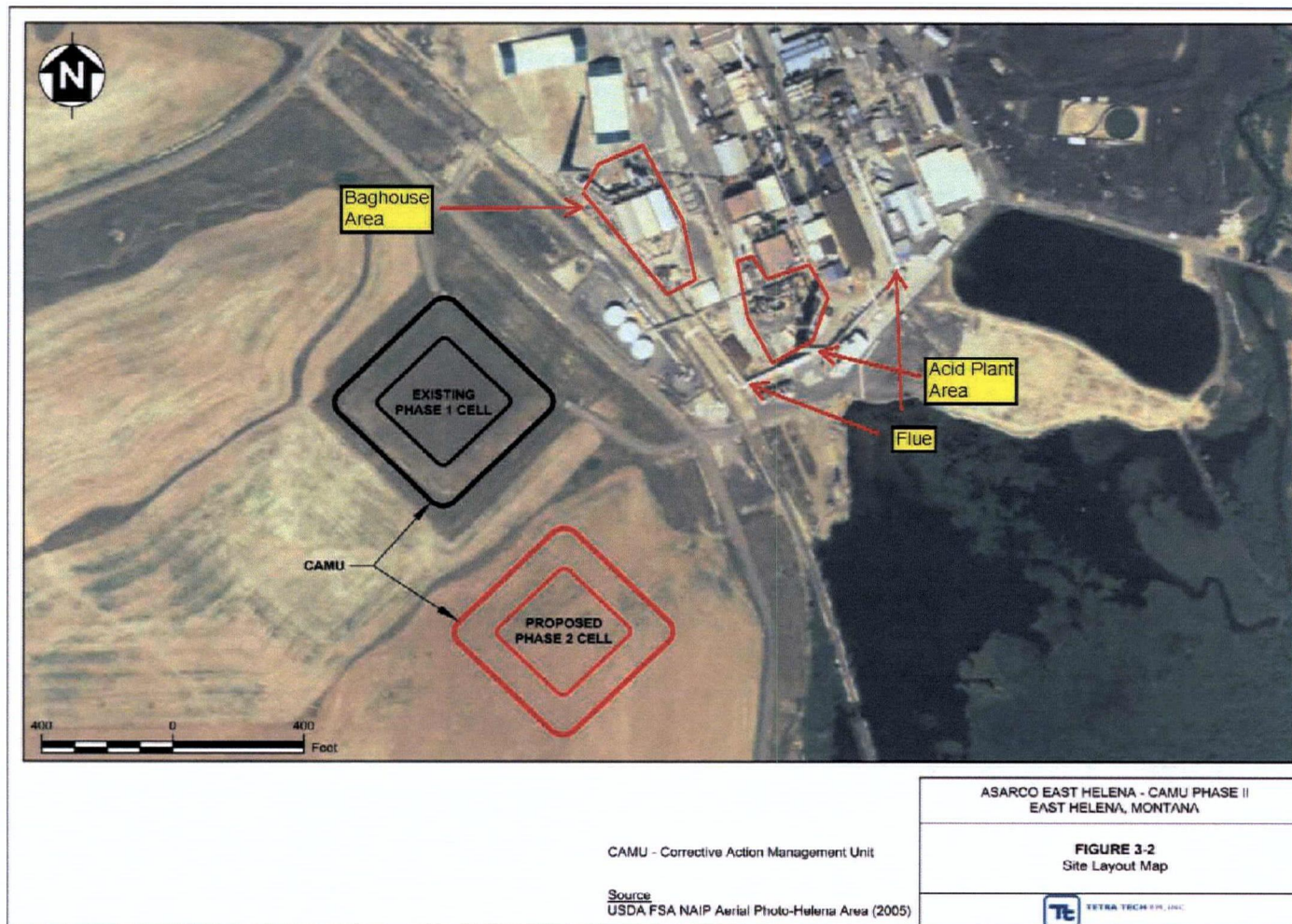


ASARCO EAST HELENA - CAMU PHASE II
EAST HELENA, MONTANA

FIGURE 3-1
Site Location

Source
Modified from: Microsoft Streets and Trips-2005





3.3 PLANNED ACTIVITIES

Field activities to be performed during the oversight of demolition and waste placement include the following tasks:

- Oversight of demolition – Demolition of the baghouses and associated flues, demolition of the acid plant, inspection of the baghouse and flues to ensure that all dust has been removed prior to demolition.
- Oversight of waste placement – Placement of waste materials in the CAMU.

4.0 SITE-SPECIFIC HAZARD EVALUATION

Field activities and physical features of the site may expose field personnel to a variety of hazards. This section provides information on potential hazards related to site activities and the nature of hazardous material impacts. Potential chemical and physical hazards related to site activities are discussed below.

4.1 CHEMICAL HAZARDS

Chemicals that may be present at the site are listed in Table 4-1. These chemicals pose various physical, chemical, and toxicological hazards. Potential routes of exposure include dermal (skin) contact, inhalation, and ingestion. The chemicals may also contaminate equipment, vehicles, instruments, and personnel. During most on-site activities Tetra Tech will perform, the overall health threat from exposure to these chemicals is uncertain because (1) actual concentrations that personnel could be exposed to cannot be predicted, (2) the actual duration of exposure is unknown, and (3) the effects of low-level exposure to a mixture of chemicals cannot be predicted. However, Tetra Tech believes that the potential for high-level exposure is limited. On-site activities where significant dust is generated are most likely to cause employee exposures.

Specific information on potential chemical hazards at the site is provided in Table 4-1, including exposure limits, anticipated exposure routes, and toxic characteristics. Table 4-2 provides a task hazard analysis of the planned field activities listed in Section 3.3.

The Material Safety Data Sheets (MSDS) included in the attachment to this HASP summarize health and safety information for hazardous materials that will be brought to the site, such as laboratory reagents,

[illegible]

TABLE 4-1

**POTENTIAL CHEMICAL HAZARDS
ASARCO EAST HELENA LEAD SMELTER SITE**

Chemical and Media	Exposure Limits and IDLH Level	Exposure Routes	Toxic Characteristics
Lead, solid, soil	PEL = 0.050 mg/m ³ REL = 0.050 mg/ m ³ IDLH = 100 mg/m ³	Inhalation, Skin and Eye Contact, Ingestion	Weakness, lassitude, insomnia, facial pallor, pal eye, anorexia, low-weight, malnutrition, constipation, abdominal pain, colic, anemia, gingival lead line, tremor, paralysis wrist and ankles, encephalopathy, kidney disease, irritation of eyes, hypotension
Arsenic, solid, soil	PEL = 0.010 mg/m ³ REL = 0.002 mg/m ³ IDLH = 5 mg/m ³	Inhalation, Skin and Eye Contact, Ingestion	Ulceration of nasal septum, dermal and gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, hyper-pigmentation of skin
Cadmium, solid, soil	PEL = 0.005 mg/m ³ REL = Not available IDLH = 9 mg/m ³	Inhalation, Skin and Eye Contact, Ingestion	Pulmonary edema, dyspnea, cough, chest tightness, substernal pain, headache, chills, muscle aches, nausea, vomiting, diarrhea, anosmia, emphysema, proteinuriam mild anemia
Asbestos	PEL = 0.2 f/cc REL = 0.1 f/cc IDLH = Nondetect	Inhalation, Skin and Eye Contact, Ingestion	Asbestosis, dyspnea, interstitial fibrosis, restricted pulmonary function, finger clubbing, irritation to eyes

Notes:

f/cc Fiber per cubic centimeter
IDLH Immediately dangerous to life or health
mg/m³ Milligram per cubic meter
PEL Permissible exposure limit
REL Recommended exposure limit

Sources: National Institute for Occupational Safety and Health. 1997. "Pocket Guide to Chemical Hazards." U.S. Department of Health and Human Services. U.S. Government Printing Office. Washington, DC. June.

TABLE 4-2

**TASK HAZARD ANALYSIS
ASARCO EAST HELENA LEAD SMELTER SITE**

Task	Potential Hazard	Controls	Initial Level of Protection	Upgraded Level of Protection
Demolition Oversight	AS, Cd, Pb, Asbestos Heat Stress Noise Heavy equipment	Full-face respirator with P-100 cartridge, SWP6-27, SWP6-28 Cool liquids, shade, SWP6-15 Ear Plugs SWP6-26	Level C	None
Waste Placement	As, Cd, Pb, Asbestos Heat Stress Noise Heavy equipment	Half-face respirator with P-100 cartridge, SWP6-27, SWP6-28 Cool liquids, shade, SWP6-15 Ear Plugs SWP6-26	Level C	None

Notes: SWP - Safe Work Practice As – Arsenic Cd – Cadmium Pb - Lead

4.2

PHYSICAL HAZARDS

Physical hazards associated with site activities present a potential threat to on-site personnel. Dangers are posed by heavy equipment, utility and power lines, slippery surfaces, unseen obstacles, noise, heat, cold, and poor illumination.

Injuries may result, for example, from the following:

- Accidents caused by slipping, tripping, or falling
- Use of improper lifting techniques
- Moving or rotating equipment
- Equipment mobilization and operation (such as electrocution from contact with overhead or underground power lines)
- Improperly maintained equipment

Injuries resulting from physical hazards can be avoided by using safe work practices (SWP) and employing caution when working with machinery. Specific SWPs applicable to the ASARCO East Helena Lead Smelter site are listed in Section 9.5 and are provided in Appendix B of this HASP. To ensure a safe workplace, the SSC will conduct and document regular safety inspections and will make sure that all Tetra Tech workers and visitors are informed of any potential physical hazards related to the site. Physical hazards that have been identified at this site include the following:

- Heat Stress – SWP6-15
- Heavy Equipment – SWP6-26

5.0 TRAINING REQUIREMENTS

All on-site personnel who may be exposed to hazardous conditions, including Tetra Tech and subcontractor personnel and site visitors who will participate in on-site activities, will be required to meet training requirements outlined in 29 CFR 1910.120, “Hazardous Waste Operations and Emergency Response.” All personnel and visitors entering the site will be required to review this HASP and sign the Compliance Agreement form (HSP-4), and site workers will be required to sign the Daily Tailgate Safety Meeting form (HST-2) (see Appendix A).

Before on-site activities begin, the Tetra Tech SSC will present a briefing for all personnel who will participate in on-site activities. The following topics will be addressed during the pre-work briefing:

- Names of the SSC and the designated alternate
- Site history
- Work tasks
- Hazardous chemicals that may be encountered on site
- Physical hazards that may be encountered on site
- PPE, including type or types of respiratory protection to be used for work tasks
- Training requirements
- Environmental surveillance (air monitoring) equipment use and maintenance
- Action levels and situations requiring upgrade or downgrade of level of protection
- Site control measures, including site communications, control zones, and SWPs
- Decontamination procedures
- Emergency communication signals and codes
- Environmental accident emergency procedures (in case contamination spreads outside the exclusion zone)
- Personnel exposure and accident emergency procedures (in case of falls, exposure to hazardous substances, and other hazardous situations)
- Fire and explosion emergency procedures
- Emergency telephone numbers
- Emergency routes

Any other health and safety-related issues that may arise before on-site activities begin will also be discussed during the pre-work briefing.

Issues that arise during implementation of on-site activities will be addressed during tailgate safety meetings to be held daily before the workday or shift begins and will be documented in the Daily

Tailgate Safety Meeting form (Form HST-2 in Appendix A). Any changes in procedures or site-specific health and safety-related matters will be addressed during these meetings.

6.0 PERSONAL PROTECTION REQUIREMENTS

The levels of personal protection to be used for work tasks at the ASARCO East Helena Lead Smelter site have been selected based on known or anticipated physical hazards; types and concentrations of contaminants that may be encountered on site; and contaminant properties, toxicity, exposure routes, and matrixes. The following sections describe protective equipment and clothing; reassessment of protection levels; limitations of protective clothing; and respirator selection, use, and maintenance.

6.1 PROTECTIVE EQUIPMENT AND CLOTHING

Personnel will wear protective equipment when (1) site activities involve known or suspected atmospheric contamination; (2) site activities may generate vapors, gases, or particulates; or (3) direct contact with hazardous materials may occur. The anticipated levels of protection selected for use by field personnel during site activities are listed in Table 4-2, Task Hazard Analysis. Based on the anticipated hazard level, personnel will perform oversight of demolition and placement of waste in the CAMU in Level C protection. Level D protection may be used in areas distant from active demolition activities. If site conditions or the results of air monitoring performed during on-site activities warrant a higher level of protection, all field personnel will withdraw from the site, immediately notify the Tetra Tech SSC, and wait for further instructions. Descriptions of equipment and clothing required for Level D, Level C, and Level B protection are provided below.

- Level D
 - Coveralls or work clothes, if applicable
 - Chemical-resistant clothing (such as Tyvek® or Saranex® coveralls)(optional)
 - Outer gloves (neoprene, nitrile, or other), if applicable
 - Disposable inner gloves (such as latex or vinyl)(optional)
 - Boots with steel-toe protection and steel shanks
 - Disposable boot covers or chemical-resistant outer boots (optional)

- Safety glasses or goggles
- Hard hat (face shield optional)
- Hearing protection (for areas with a noise level exceeding 85 decibels on the A-weighted scale)
- Level C
 - Coveralls or work clothes, if applicable
 - Chemical-resistant clothing (such as Tyvek® or Saranex® coveralls)
 - Outer gloves (neoprene, nitrile, or other), if applicable
 - Disposable inner gloves (latex or vinyl)
 - Boots with steel-toe protection and steel shanks
 - Disposable boot covers or chemical-resistant outer boots
 - Full-face, air-purifying respirator with National Institute for Occupational Safety and Health (NIOSH)-approved cartridges to protect against organic vapors, dust, fumes, and mists (cartridges used for gas and vapors must be replaced in accordance with the change-out schedule described in the Respiratory Hazard Assessment form [Form RP-2] in Appendix C)
 - Safety glasses or goggles (with a half-face respirator only)
 - Hard hat (face shield optional)
 - Hearing protection (for areas with a noise level exceeding 85 decibels on the A-weighted scale)
- Level B
 - Chemical-resistant clothing (such as Tyvek® or Saranex® coveralls)
 - Outer gloves (neoprene, nitrile, or other)
 - Disposable inner gloves (latex or vinyl)
 - Boots with steel-toe protection and steel shanks
 - Disposable boot covers or chemical-resistant outer boots
 - NIOSH-approved, pressure-demand airline respirator with a 5-minute escape cylinder or self-contained breathing apparatus (SCBA)

- Hard hat (face shield optional)
- Hearing protection (for areas with a noise level exceeding 85 decibels on the A-weighted scale)

6.2 REASSESSMENT OF PROTECTION LEVELS

PPE levels shall be upgraded or downgraded based on a change in site conditions or investigation findings. When a significant change in site conditions occurs, hazards will be reassessed. Some indicators of the need for reassessment are as follows:

- Commencement of a new work phase, such as the start of a significantly different sampling activity or work that begins on a different portion of the site
- A change in job tasks during a work phase
- A change of season or weather
- Temperature extremes or individual medical considerations limiting the effectiveness of PPE
- Discovery of contaminants other than those previously identified
- A change in ambient levels of airborne contaminants (see the action levels listed in Table 8-1)
- A change in work scope that affects the degree of contact with contaminated media

6.3 LIMITATIONS OF PROTECTIVE CLOTHING

PPE clothing ensembles designated for use during site activities have been selected to provide protection against contaminants at known or anticipated on-site concentrations and physical states. However, no protective garment, glove, or boot is entirely chemical-resistant, nor does any protective clothing provide protection against all types of chemicals. Permeation of a given chemical through PPE depends on the contaminant concentration, environmental conditions, physical condition of the protective garment, and resistance of the garment to the specific contaminant. Chemical permeation may continue even after the source of contamination has been removed from the garment.

All site personnel will use the procedures presented below to obtain optimum performance from PPE.

- When chemical-protective coveralls become contaminated, don a new, clean garment after each rest break or at the beginning of each shift.
- Inspect all clothing, gloves, and boots both before and during use for the following:
 - Imperfect seams
 - Non-uniform coatings
 - Tears
 - Poorly functioning closures
- Inspect reusable garments, boots, and gloves both before and during use for visible signs of chemical permeation, such as the following:
 - Swelling
 - Discoloration
 - Stiffness
 - Brittleness
 - Cracks
 - Any sign of puncture
 - Any sign of abrasion

Reusable gloves, boots, or coveralls exhibiting any of the characteristics listed above must be discarded. Reusable PPE will be decontaminated in accordance with procedures described in Section 10.0 and will be neatly stored in the support zone away from work zones.

6.4 RESPIRATOR SELECTION, USE, AND MAINTENANCE

Tetra Tech and subcontractor personnel will be informed of the proper use, maintenance, and limitations of respirators during annual health and safety refresher training and the pre-work briefing. Any on-site personnel who will use a tight-fitting respirator must pass a qualitative fit test for the respirator that follows the fit testing protocol provided in Appendix A of the OSHA respirator standard (29 CFR 1910.134). Fit testing must be repeated annually or when a new type of respirator is used.

Respirator selection is based on the assessment of the nature and extent of hazardous atmospheres anticipated during field activities. This assessment includes a reasonable estimate of employee exposure to respiratory hazards and identification of each contaminant's anticipated chemical form and physical state.

For each work task requiring respirator use at the ASARCO East Helena Lead Smelter site, a respiratory hazard assessment has been conducted. Typically, the results of this assessment are documented in the Respiratory Hazard Assessment form (Form RP-2), and approved by the HSR. For this project, since P-100 respirator cartridges are being used, Form RP-2 is not necessary or required. Tetra Tech employees will wear full-face respirators during on-site activities designated for Level C personal protection. Respirator cartridges shall be changed at a minimum at the end of each work-shift, but also if breathing through the cartridges becomes difficult.

When the atmospheric contaminant is an identified gas or vapor and its concentration is known or can be reasonably estimated, respiratory protection options include the following:

- An atmosphere-supplying respirator (air-line or SCBA)
- An air-purifying respirator equipped with a NIOSH-certified, end-of-service-life indicator (ESLI) for the identified contaminant. If no ESLI is available, a change-out schedule for cartridges must be developed based on objective data or information. Respirator cartridge selection and change-out schedules will be evaluated by the HSR at the time of the respiratory hazard assessment. The Respiratory Hazard Assessment, Form RP-2, will describe the information and data used as the basis for the cartridge change-out schedule and the proposed change schedule.

For protection against particulate contaminants, approved respirators can include the following:

- An atmosphere supplying respirator
- A respirator equipped with a filter certified by NIOSH under 32 CFR Part 11 or 42 CFR Part 84 as a P100 filter (formerly known as a high-efficiency particulate [HEPA] air filter)

For any tasks performed in Level C PPE, a full-face, air-purifying respirator equipped with NIOSH-approved cartridges or filters will be selected to protect against vapors, gases, and aerosols.

Air-purifying respirators will be used only in conjunction with breathing-space air monitoring, which must be conducted in adherence to the action levels outlined in Table 8-1. Air-purifying respirators will be used only when they can provide protection against the substances encountered on site.

Factors precluding use of Level C and air-purifying respirators are as follows:

- Oxygen-deficient atmosphere (less than 19.5 percent oxygen)
- Concentrations of substances that may be immediately dangerous to life and health
- Confined or unventilated areas that may contain airborne contaminants not yet characterized
- Unknown contaminant concentrations or concentrations that may exceed the maximum use levels for designated cartridges documented in the selected cartridge manufacturer's instructions
- Unidentified contaminants
- High relative humidity (more than 85 percent, which reduces the sorbent life of the cartridges)
- Respirator cartridges with an undetermined service life

Use, cleaning, and maintenance of respirators are described in SWP 6-27, Respirator Cleaning Procedures, and SWP 6-28, Safe Work Practices for Use of Respirators. These SWPs are included in Appendix B.

7.0 MEDICAL SURVEILLANCE

The following sections describe Tetra Tech's medical surveillance program, including health monitoring requirements, site-specific medical monitoring, and medical support and follow-up requirements. Procedures documented in these sections will be followed for all activities at the ASARCO East Helena Lead Smelter site. Additional requirements are defined in the Tetra Tech, Inc., "Health and Safety Manual."

7.1 HEALTH MONITORING REQUIREMENTS

All Tetra Tech and subcontractor personnel involved in on-site activities at the ASARCO East Helena Lead Smelter site must participate in a health monitoring program as required by 29 CFR 1910.120(f). Tetra Tech has established a health monitoring program with WorkCare, Inc., of Orange, California. Under this program, Tetra Tech personnel receive baseline and annual or biennial physical examinations consisting of the following:

- Complete medical and work history
- Physical examination
- Vision screening
- Audiometric screening
- Pulmonary function test
- Resting electrocardiogram
- Chest x-ray (required once every 3 years)
- Blood chemistry, including hematology and serum
- Urinalysis

For each employee, Tetra Tech receives a copy of the examining physician's written opinion after postexamination laboratory tests have been completed; the Tetra Tech employee also receives a copy of the written opinion. This opinion includes the following information (in accordance with 29 CFR 1910.120[f][7]):

- The results of the medical examination and tests
- The physician's opinion as to whether the employee has any medical conditions that would place the employee at an increased risk of health impairment from work involving hazardous waste operations or during an emergency response
- The physician's recommended limitations, if any, on the employee's assigned work; special emphasis is placed on fitness for duty, including the ability to wear any required PPE under conditions expected on site (for example, temperature extremes)

- A statement that the employee has been informed by the physician of the medical examination results and of any medical conditions that require further examination or treatment

All subcontractors must have health monitoring programs conducted by their own clinics in compliance with 29 CFR 1910.120(f). Any visitor or observer at the site will be required to provide records in compliance with 29 CFR 1910.120(f) before entering the site.

7.2 SITE-SPECIFIC MEDICAL MONITORING

For employees participating in on-site activities at the ASARCO East Helena Lead Smelter site, levels of lead (including ZPP), arsenic and cadmium will be assessed before individuals enter the exclusion zone or decontamination zone (see Section 9.2, Site Control Zones). Employee levels of these heavy metals will be evaluated again at the end of the project to ensure no exposure has occurred.

7.3 MEDICAL SUPPORT AND FOLLOW-UP REQUIREMENTS

As a follow-up to an injury requiring care beyond basic first aid or to possible exposure above established exposure limits, all employees are entitled to and encouraged to seek medical attention and physical testing. Such injuries and exposures must be reported to the HSR. Depending on the type of injury or exposure, follow-up testing, if required, must be performed within 24 to 48 hours of the incident. It will be the responsibility of the employer's medical consultant to advise the type of test required to accurately monitor for exposure effects. The Incident Report (Form IR in Appendix A) must be completed by the Tetra Tech SSC in the event of an accident, illness, or injury. A copy of this form must be forwarded to the HSR for use in determining the recordability of the incident and for inclusion in Tetra Tech's medical surveillance records.

8.0 ENVIRONMENTAL MONITORING AND SAMPLING

Tetra Tech will complete no environmental monitoring. The construction contractor will provide environmental monitoring in accordance with the procedures defined in the remedial design (Hydrometric 2007). Tetra Tech will review the results of the environmental monitoring.

9.0 SITE CONTROL

Site control will be the responsibility of the construction contractor using the procedures defined in the remedial design (Hydrometrics 2007). Tetra Tech will observe site control measures to make sure they comply with the remedial design. The site control measures discussed in the following sections will apply only to Tetra Tech personnel. The following sections discuss measures and procedures for site control, such as on-site communications, site control zones, site access control, site safety inspections, and SWPs.

9.1 ON-SITE COMMUNICATIONS

Only one Tetra Tech employee will be present at the site. The Tetra tech employee will have a phone for communication with Tetra Tech and EPA office personnel. Tetra Tech will follow the on-site communication procedures defined in the construction contractors health and safety plan (URS 2007) to communicate with construction contractor personnel. The following communication systems will be available during site activities:

- Cellular telephones

9.2 SITE CONTROL ZONES

Site control will be the responsibility of the construction contractor. The single Tetra Tech employee present at the site will set up a station where he can remove his respirator and PPE after visits to the contaminated area. To control the spread of contamination and employee exposures to chemical and physical hazards, on-site work areas may be divided into an exclusion zone, a decontamination zone, and a support zone. Access to the exclusion and decontamination zones will be restricted to authorized personnel. Any visitors to these areas must present proper identification and be authorized to be on site. The Tetra Tech SSC will identify work areas that visitors or personnel are authorized to enter and will enforce site control measures.

The following sections describe the exclusion zone, the decontamination zone, and the support zone as well as procedures to be followed in each.

9.2.1 Zone 1: Exclusion Zone

An exclusion zone includes areas where contamination is either known or likely to be present or, because of work activity, has the potential to cause harm to personnel. The perimeter of the exclusion zone and an appropriate radius around work task areas will be demarcated by a physical barrier, such as barricade tape or traffic cones, to restrict access. A daily roster with the date of each person's entrance into the exclusion zone; the person's name, signature, and organization; and the time of entry and exit will be kept for all personnel working in the zone. Visitors will not be permitted to enter the exclusion zone without proper qualifications, equipment, and Tetra Tech SSC authorization. Work tasks that may require establishment of an exclusion zone include the following:

- Oversight of placement of the first lift of waste material.

9.2.2 Zone 2: Decontamination Zone

A decontamination zone is not required for the ASARCO East Helena Lead Smelter site. The decontamination zone will contain facilities to decontaminate personnel. Equipment decontamination procedures are described in Section 10.0. Visitors will not be permitted to enter the decontamination zone without proper qualifications and Tetra Tech SSC authorization.

9.2.3 Zone 3: Support Zone

A support zone may consist of any uncontaminated and non-hazardous part of the site. The support zone should be situated in an area generally upwind of any exclusion zone whenever possible. Site visitors not meeting training, medical surveillance, and PPE requirements must stay in the support zone.

9.3 SITE ACCESS CONTROL

Site access control will be the responsibility of the construction contractor. The study area at the ASARCO East Helena Lead Smelter site is bounded by fences and open land. Access to the site is controlled by a security gate at the start of the access road.

9.4 SITE SAFETY INSPECTIONS

Periodic site safety inspections shall be conducted by the Tetra Tech SSC to ensure safe work areas and compliance with this HASP. Results of the site safety inspections will be recorded on a Field Audit Checklist (Form AF-1 in Appendix A).

9.5 SAFE WORK PRACTICES

Various SWPs are applicable to the ASARCO East Helena Lead Smelter site. These SWPs are included in Appendix B to this HASP. The following SWPs apply to the site:

- SWP 6-1, General Safe Work Practices
- SWP 6-15, Heat Stress
- SWP 6-26, Use of Heavy Equipment
- SWP 6-27, Respirator Cleaning Procedures
- SWP 6-28, Safe Work Practices for Use of Respirators

10.0 DECONTAMINATION

Decontamination is the process of removing or neutralizing contaminants on personnel or equipment. When properly conducted, decontamination procedures protect workers from contaminants that may have accumulated on PPE, tools, and other equipment. Proper decontamination also prevents transport of potentially harmful materials to uncontaminated areas. Personnel and equipment decontamination procedures are described in the following sections.

10.1 PERSONNEL DECONTAMINATION

Personnel decontamination at the site will be limited by using disposable PPE whenever possible. Any personnel decontamination procedures will follow guidance in the *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities* (NIOSH and others 1985). Personnel and PPE will be decontaminated with potable water or a mixture of detergent and water. Liquid and solid wastes generated during decontamination will be transferred to the construction contractor for disposal.

The decontamination procedures listed below will be conducted if personnel decontamination is required.

- Wash neoprene boots or disposable booties with a Liquinox® or Alconox® solution, and rinse them with water. Remove and retain neoprene boots for reuse, if possible. Place disposable booties in plastic bags for disposal.
- Wash outer gloves in a Liquinox® or Alconox® solution, and rinse them in water. Remove outer gloves and place them in a plastic bag for disposal.
- Remove chemical-resistant clothing, and place it in a plastic bag for disposal.
- Remove the air-purifying respirator, if used, and place the spent filter in a plastic bag for disposal. The filter must be changed in accordance with the Respiratory Hazard Assessment form (Form RP-2 in Appendix C). Clean and disinfect the respirator in accordance with SWP 6-27, and place it in a plastic bag for storage.
- Remove inner gloves and place them in a plastic bag for disposal.
- Thoroughly wash the hands and face with water and soap.

Used, disposable PPE will be collected in sealable containers and will be disposed of in accordance with procedures described in the ASARCO remedial design (Hydrometrics 2007). Personnel decontamination procedures may be modified as necessary while on site.

10.2 EQUIPMENT DECONTAMINATION

No Tetra Tech equipment decontamination will be required.

10.2.1 Heavy Equipment

No Tetra Tech heavy equipment decontamination will be required.

10.2.2 Sampling Equipment

No Tetra Tech sampling equipment decontamination will be required.

11.0 EMERGENCY RESPONSE PLANNING

This section describes emergency response planning procedures to be implemented for the site. This section is consistent with local, state, and federal disaster and emergency management plans. The following sections discuss pre-emergency planning, personnel roles and lines of authority, emergency

recognition and prevention, evacuation routes and procedures, emergency contacts and notifications, hospital route directions, emergency medical treatment procedures, protective equipment failure, fire or explosion, weather-related emergencies, spills or leaks, emergency equipment and facilities, and reporting.

11.1 PRE-EMERGENCY PLANNING

During the pre-work briefing and daily tailgate safety meetings, all on-site employees will be trained in and reminded of the provisions of Section 11.0, site communication systems, and site evacuation routes. The emergency response provisions will be reviewed on a regular basis by the Tetra Tech SSC and will be revised, if necessary, to ensure that they are adequate and consistent with prevailing site conditions.

11.2 PERSONNEL ROLES AND LINES OF AUTHORITY

The Tetra Tech SSC has primary responsibility for responding to and correcting emergency situations and for taking appropriate measures to ensure the safety of site personnel and the public. Possible actions may include evacuation of personnel from the site area. The SSC is also responsible for ensuring that corrective measures have been implemented, appropriate authorities have been notified, and follow-up reports have been completed.

Individual subcontractors are required to cooperate with the SSC, within the parameters of their scopes of work.

Personnel are required to report all injuries, illnesses, spills, fires, and property damage to the SSC. The SSC must be notified of any on-site emergencies and is responsible for ensuring that the appropriate emergency procedures described in this section are followed. The local fire or emergency response department will be supplied with a copy of this HASP before site work begins.

11.3 EMERGENCY RECOGNITION AND PREVENTION

Table 4-1 lists potential on-site chemical hazards, and Table 4-2 provides information on the hazards associated with the different tasks planned for the site. On-site personnel will be made familiar with this information and with techniques of hazard recognition through pre-work training and site-specific briefings.

11.4 EVACUATION ROUTES AND PROCEDURES

In the event of an emergency that necessitates evacuation of a work task area or the site, the Tetra Tech SSC shall contact all nearby personnel using the on-site communications discussed in Section 9.1 to advise the personnel of the emergency. The personnel will proceed along site roads to a safe distance upwind from the hazard source. The personnel will remain in that area until the SSC or an authorized individual provides further instructions.

11.5 EMERGENCY CONTACTS AND NOTIFICATIONS

The emergency information before Section 1.0 of this HASP provides names and telephone numbers of emergency contact personnel. **THIS PAGE MUST BE POSTED ON SITE OR MUST BE READILY AVAILABLE AT ALL TIMES.** In the event of a medical emergency, personnel will notify the appropriate emergency organization and will take direction from the Tetra Tech SSC. In the event of a fire, explosion, or spill at the site, the SSC will notify the appropriate local, state, and federal agencies and will follow procedures discussed in Section 11.9 or 11.11.

11.6 HOSPITAL ROUTE DIRECTIONS

Before performing any site activities, Tetra Tech personnel will conduct a pre-emergency hospital run to familiarize themselves with the route to the local hospital. A map showing the hospital route is provided in the emergency information before Section 1.0 of this HASP.

11.7 EMERGENCY MEDICAL TREATMENT PROCEDURES

A person who becomes ill or injured during work tasks may require decontamination. If the illness or injury is minor, any decontamination necessary will be completed and first aid should be administered prior to patient transport. If the patient's condition is serious, partial decontamination will be completed (such as complete disrobing of the person and redressing in the person in clean coveralls or wrapping in a blanket).. First aid should be administered until an ambulance or paramedics arrive. All injuries and illnesses must be reported immediately to the Tetra Tech task order manager and HSR.

Any person transported to a clinic or hospital for chemical exposure treatment will be accompanied by information on the chemical he or she has been exposed to at the site, if possible. Table 4-1 contains this information.

11.8 PROTECTIVE EQUIPMENT FAILURE

If any worker in the exclusion zone experiences a failure of protective equipment (either engineering controls or PPE) that affects his or her personal protection, the worker and all coworkers will immediately leave the exclusion zone. Re-entry to the exclusion zone will not be permitted until (1) the protective equipment has been repaired or replaced, (2) the cause of the equipment failure has been determined, and (3) the equipment failure is no longer considered to be a threat.

11.9 FIRE OR EXPLOSION

The construction contractor will be responsible for responding to any fire or explosion. Tetra Tech personnel will evacuate the site in the event of a fire or explosion on site.

11.10 WEATHER-RELATED EMERGENCIES

The construction contractor will be responsible for monitoring weather and wind speed during construction. At any time, Tetra Tech personnel present at the site may stop work because of weather-related emergencies. Oversight work shall not be conducted during severe weather conditions, including high wind speeds or lightning. Field personnel will leave the site in the event of severe weather.

Thermal stress caused by excessive heat or cold may occur as a result of extreme temperatures, workload, or the PPE used. Heat stress treatment will be administered as described in SWP 6-15. The oversight is to be completed during summer 2007 and cold stress should not be an issue.

11.11 SPILLS OR LEAKS

The construction contractor will be responsible for any spill or leak. In the event of a severe spill or leak, Tetra Tech personnel will evacuate the affected area and relocate personnel to an upwind location.

11.12 EMERGENCY EQUIPMENT AND FACILITIES

The following emergency equipment will be available on site:

- First aid kit
- Mobile telephone

11.13 REPORTING

All emergency situations require follow-up and reporting. Appendix A includes the Tetra Tech Incident Report (Form IR). In case of an emergency situation, a telephone report must be made to the HSR and task order manager immediately. Form IR must be completed and submitted to the Tetra Tech HSR within 24 hours of an emergency situation, and must be signed by the affected employee, project manager, and site safety coordinator. The report must include proposed actions to prevent similar incidents from occurring. The HSR must be fully informed of the corrective action process so that she may implement applicable elements of the process at other sites.

1. *What is the purpose of this study?*

2. *What are the research objectives?*

3. *What is the research methodology?*

4. *What are the research findings?*

5. *What are the conclusions?*

6. *What are the limitations of the study?*

7. *What are the implications of the study?*

8. *What are the future research directions?*

9. *What are the contributions of the study?*

10. *What are the key words?*

12.0 REFERENCES

- American Conference of Governmental Industrial Hygienists (ACGIH). "Threshold Limit Values and Biological Exposure Indices for 1998." Latest edition.
- Hydrometrics Inc., 2007. "Design Analysis Report, ASARCO East Helena, Corrective Action Management Unit (CAMU) Phase 2 Cell." May 2007.
- National Institute for Occupational Safety and Health (NIOSH) and others. 1985. *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*. October.
- NIOSH. 1997. "Pocket Guide to Chemical Hazards." U.S. Department of Health and Human Services. U.S. Government Printing Office. Washington, DC. June.
- Tetra Tech, Inc. 1999. "Health and Safety Manual."
- URS Corporation. 2007. "Site Specific Environmental Health & Safety Action Plan, ASARCO: 2007 Demolition and CAMU Phase 2 Project. April 2007.

APPENDIX A
TETRA TECH FORMS

(Eight Sheets)

- Compliance Agreement (Form HSP-4)
- Daily Tailgate Safety Meeting (Form HST-2)
- Daily Site Log (Form SSC-1)
- Incident Report (Form IR)
- Field Audit Checklist (Form AF-1)



TETRA TECH, INC.

HEALTH AND SAFETY PLAN COMPLIANCE AGREEMENT

Project Name: _____

Project Number: _____

I have read and understand the health and safety plan indicated above and agree to comply with all of its provisions. I understand that I could be prohibited from working on the project for violating any of the safety requirements specified in the plan.

Name	Signature	Employer	Date
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____



TETRA TECH, INC.

DAILY TAILGATE SAFETY MEETING FORM

Date: _____ Time: _____ Project No.: _____

Client: _____ Site Location: _____

Site Activities Planned for Today: _____

Safety Topics Discussed
Protective clothing and equipment:
Chemical hazards:
Physical hazards:
Environmental and biohazards:
Equipment hazards:
Decontamination procedures:
Other:
Review of emergency procedures:
Employee Questions or Comments:



TETRA TECH, INC.

DAILY TAILGATE SAFETY MEETING FORM (Continued)

Attendees	
Printed Name	Signature

Meeting Conducted by:

Name

Title

Signature



TETRA TECH, INC.
DAILY SITE LOG

Site Name: _____ Date: _____

Name (print)	Company	Time	
		In	Out

Comments:



Report Date	Report Prepared By	Incident Report Number
INSTRUCTIONS: All incidents (including those involving subcontractors under direct supervision of Tetra Tech personnel) must be documented on the IR Form. Complete any additional parts to this form as indicated below for the type of incident selected.		
TYPE OF INCIDENT (Check all that apply)		Additional Form(s) Required for this type of incident
Near Miss (No losses, but could have resulted in injury, illness, or damage)	<input type="checkbox"/>	Complete IR Form Only
Injury or Illness	<input type="checkbox"/>	Complete Form IR-A; Injury or Illness
Property or Equipment Damage, Fire, Spill or Release	<input type="checkbox"/>	Complete Form IR-B; Damage, Fire, Spill or Release
Motor Vehicle	<input type="checkbox"/>	Complete Form IR-C; Motor Vehicle
INFORMATION ABOUT THE INCIDENT		
Description of Incident 		
Date of Incident	Time of Incident _____ AM <input type="checkbox"/> PM <input type="checkbox"/> OR Cannot be determined <input type="checkbox"/>	
Weather conditions at the time of the incident	Was there adequate lighting? _____ Yes <input type="checkbox"/> No <input type="checkbox"/>	
Location of Incident _____ Was location of incident within the employer's work environment? Yes <input type="checkbox"/> No <input type="checkbox"/>		
Street Address	City, State, Zip Code and Country	
Project Name	Client:	
Tt Supervisor or Project Manager	Was supervisor on the scene? Yes <input type="checkbox"/> No <input type="checkbox"/>	
WITNESS INFORMATION (attach additional sheets if necessary)		
Name	Company	
Street Address	City, State and Zip Code	
Telephone Number(s)		



CORRECTIVE ACTIONS

Corrective action(s) immediately taken by unit reporting the incident:

Corrective action(s) still to be taken (by whom and when):

ROOT CAUSE ANALYSIS LEVEL REQUIRED

Root Cause Analysis Level Required: Level - 1 ☐ Level - 2 ☐ None ☐

Root Cause Analysis Level Definitions

Level - 1	<p>Definition: A Level 1 RCA is conducted by an individual(s) with experience or training in root cause analysis techniques and will conduct or direct documentation reviews, site investigation, witness and affected employee interviews, and identify corrective actions. Activating a Level 1 RCA and identifying RCA team members will be at the discretion of the Corporate Administration office.</p> <p>The following events may trigger a Level 1 RCA:</p> <ul style="list-style-type: none">▪ Work related fatality▪ Hospitalization of one or more employee where injuries result in total or partial permanent disability▪ Property damage in excess of \$75,000▪ When requested by senior management
Level - 2	<p>Definition: A Level 2 RCA is self performed within the operating unit by supervisory personnel with assistance of the operating unit HSR. Level 2 RCA will utilize the 5 Why RCA methodology and document the findings on the tools provided.</p> <p>The following events will require a Level 2 RCA:</p> <ul style="list-style-type: none">▪ OSHA recordable lost time incident▪ Near miss incident that could have triggered a Level 1 RCA▪ When requested by senior management

Complete the Root Cause Analysis Worksheet and Corrective Action form. Identify a corrective action(s) for each root cause identified within each area of inquiry.

NOTIFICATIONS

Title	Printed Name	Signature	Telephone Number	Date
Project Manager or Supervisor				
Site Safety Coordinator or Office H&S Representative				
Operating Unit H&S Representative				
Other: _____				

The signatures provided above indicate that appropriate personnel have been notified of the incident.



TETRA TECH, INC.
FIELD AUDIT CHECKLIST

Project Name: _____ Project No.: _____

Field Location: _____ Completed by: _____

Project Manager: _____ Site Safety Coordinator: _____

General Items		In Compliance?		
Health and Safety Plan Requirements		Yes	No	NA
1	Approved health and safety plan (HASP) on site or available			
2	Names of on-site personnel recorded in field logbook or daily log			
3	HASP compliance agreement form signed by all on-site personnel			
4	Material Safety Data Sheets on site or available			
5	Designated site safety coordinator present			
6	Daily tailgate safety meetings conducted and documented			
7	On-site personnel meet HASP requirements for medical examinations, fit testing, and training (including subcontractors)			
8	Compliance with specified safe work practices			
9	Documentation of training, medical examinations, and fit tests available from employer			
10	Exclusion, decontamination, and support zones delineated and enforced			
11	Windsock or ribbons in place to indicate wind direction			
12	Illness and injury prevention program reports completed (California only)			
Emergency Planning				
13	Emergency telephone numbers posted			
14	Emergency route to hospital posted			
15	Local emergency providers notified of site activities			
16	Adequate safety equipment inventory available			
17	First aid provider and supplies available			
18	Eyewash stations in place			
Air Monitoring				
19	Monitoring equipment specified in HASP available and in working order			
20	Monitoring equipment calibrated and calibration records available			
21	Personnel know how to operate monitoring equipment and equipment manuals available on site			
23	Environmental and personnel monitoring performed as specified in HASP			



TETRA TECH, INC.
FIELD AUDIT CHECKLIST (Continued)

Safety Items		In Compliance?		
Personal Protection		Yes	No	NA
1	Splash suit			
2	Chemical protective clothing			
3	Safety glasses or goggles			
4	Gloves			
5	Overboots			
6	Hard hat			
7	Dust mask			
8	Hearing protection			
9	Respirator			
Instrumentation				
10	Combustible gas meter			
11	Oxygen meter			
12	Organic vapor analyzer			
Supplies				
13	Decontamination equipment and supplies			
14	Fire extinguishers			
15	Spill cleanup supplies			
Corrective Action Taken During Audit:				
Corrective Action Still Needed:				

Note: NA = Not applicable

Auditor's Signature

Site Safety Coordinator's Signature

Date

APPENDIX B
SAFE WORK PRACTICES

(Nineteen Sheets)

- SWP 6-1 General Safe Work Practices
- SWP 6-15 Heat Stress
- SWP 6-26 Use of Heavy Equipment
- SWP 6-27 Respirator Cleaning Procedures
- SWP 6-28 Safe Work Practices for Use of Respirators



TETRA TECH, INC.
HEALTH AND SAFETY MANUAL
VOLUME III

SAFE WORK PRACTICES (SWP)

GENERAL SAFE WORK PRACTICES

SWP NO.: 6-1

ISSUE DATE: JULY 1998

REVISION NO.: 1

Disclaimer: This safe work practice (SWP) is the property of Tetra Tech, Inc. (Tetra Tech), and its subsidiaries. Any reuse of the SWP without Tetra Tech's permission is at the sole risk of the user. The user will hold harmless Tetra Tech for any damages that result from unauthorized reuse of this SWP. Authorized users are responsible for obtaining proper training and qualification from their employer before performing operations described in this SWP.

swp6-01_general_safe_work_practices

GENERAL SAFE WORK PRACTICES

To prevent injuries and adverse health effects, the following general safe work practices (SWP) are to be followed when conducting work involving known and unknown site hazards. These SWPs establish a pattern of general precautions and measures for reducing risks associated with hazardous site operations. This list is not inclusive and may be amended as necessary.

- Do not eat, drink, chew gum or tobacco, take medication, or smoke in contaminated or potentially contaminated areas or where the possibility for the transfer of contamination exists.
- Wash hands and face thoroughly upon leaving a contaminated or suspected contaminated area. A thorough shower and washing must be conducted as soon as possible if excessive skin contamination occurs.
- Avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, or other such areas. Avoid, whenever possible, kneeling on the ground or leaning or sitting on drums, equipment, or the ground. Do not place monitoring equipment on potentially contaminated surfaces.
- Remove beards or facial hair that interfere with a satisfactory qualitative respirator fit test or routine pre-entry positive and negative pressure checks.
- Be familiar with and knowledgeable of and adhere to all instructions in the site-specific health and safety plan (HASP). At a minimum, a safety meeting will be held at the start of each project to discuss the HASP. Additional meetings will be held, as necessary, to address new or continuing safety and health concerns.
- Be aware of the location of the nearest telephone and all emergency telephone numbers.
- Attend a briefing on the anticipated hazards, equipment requirements, SWPs, emergency procedures, and communication methods before going on site.
- Plan and delineate entrance, exit, and emergency escape routes.
- Rehearse unfamiliar operations prior to implementation.
- Use the "buddy system" whenever respiratory protection equipment is in use. Buddies should establish hand signals or other means of emergency communication in case radios break down or are unavailable.
- Buddies should maintain visual contact with each other and with other on-site team members by remaining in close proximity in order to assist each other in case of emergency.

Disclaimer: This safe work practice (SWP) is the property of Tetra Tech, Inc. (Tetra Tech), and its subsidiaries. Any reuse of the SWP without Tetra Tech's permission is at the sole risk of the user. The user will hold harmless Tetra Tech for any damages that result from unauthorized reuse of this SWP. Authorized users are responsible for obtaining proper training and qualification from their employer before performing operations described in this SWP.

- Minimize the number of personnel and equipment in contaminated areas (such as the exclusion zone). Nonessential vehicles and equipment should remain within the support zone.
- Establish appropriate support, contamination reduction, and exclusion zones.
- Establish appropriate decontamination procedures for leaving the site.
- Immediately report all injuries, illnesses, and unsafe conditions, practices, and equipment to the site safety coordinator (SSC).
- Maintain a portion of the site field logbook as a project safety log. The project safety log will be used to record the names, entry and exit dates, and times on site of all Tetra Tech, subcontractor, and project site visitor personnel; air quality and personal exposure monitoring data; and other information related to safety matters. Form SSC-1, Daily Site Log, may be used to record names of on-site personnel.
- A portable eyewash station should be located in the support zone if chemical splashes to eyes are possible.
- Do not bring matches and lighters in the exclusion zone or contamination reduction zone.
- Observe coworkers for signs of toxic exposure and heat or cold stress.
- Inform coworkers of nonvisual effects of illness if you experience them, such as headaches, dizziness, nausea, or blurred vision.

Disclaimer: This safe work practice (SWP) is the property of Tetra Tech, Inc. (Tetra Tech), and its subsidiaries. Any reuse of the SWP without Tetra Tech's permission is at the sole risk of the user. The user will hold harmless Tetra Tech for any damages that result from unauthorized reuse of this SWP. Authorized users are responsible for obtaining proper training and qualification from their employer before performing operations described in this SWP.



TETRA TECH, INC.
HEALTH AND SAFETY MANUAL
VOLUME III

SAFE WORK PRACTICES (SWP)

HEAT STRESS

SWP NO.: 6-15

ISSUE DATE: JULY 1998

REVISION NO.: 1

Disclaimer: This safe work practice (SWP) is the property of Tetra Tech, Inc. (Tetra Tech), and its subsidiaries. Any reuse of the SWP without Tetra Tech's permission is at the sole risk of the user. The user will hold harmless Tetra Tech for any damages that result from unauthorized reuse of this SWP. Authorized users are responsible for obtaining proper training and qualification from their employer before performing operations described in this SWP.

swp6-15_heat_stress

HEAT STRESS

This safe work practice (SWP) describes situations where heat stress is likely to occur and provides procedures for the prevention and treatment of heat-related injuries and illnesses. Wearing personal protective equipment (PPE), especially during warm weather, puts employees at considerable risk of developing heat-related illness. Health effects from heat stress may range from transient heat fatigue or rashes to serious illness or death.

Many factors contribute to heat stress, including PPE, ambient temperature and humidity, workload, and the physical condition of the employee, as well as predisposing medical conditions. However, the primary factors are elevated ambient temperatures in combination with fluid loss. Because heat stress is one of the more common health concerns that may be encountered during field activities, employees must be familiar with the signs, symptoms, and various treatment methods of each form of heat stress. Heat stroke is the most serious heat-related illness—it is a threat to life and has a 20 percent mortality rate. Direct exposure to sun, poor air circulation, poor physical condition, and advanced age directly affect the tendency to heat stroke. Table 1 lists the most serious heat conditions, their causes, signs and symptoms, and treatment.

Training is an important component of heat stress prevention. Employees are instructed to recognize and treat heat-related illnesses during 8-hour health and safety refresher and first aid training courses. When working in hot environments, specific steps should be taken to lessen the chances of heat-related illnesses. These include the following:

- Ensuring that all employees drink plenty of fluids (Gatorade® or its equivalent)
- Ensuring that frequent breaks are scheduled so overheating does not occur
- Revising work schedules, when necessary, to take advantage of the cooler parts of the day (such as working from 5:00 a.m. to 11:00 a.m. and 6:00 p.m. to nightfall).

When PPE must be worn (especially Levels A and B), suggested guidelines relating to ambient temperature and maximum wearing time per excursion are as shown in Table 2.

Disclaimer: This safe work practice (SWP) is the property of Tetra Tech, Inc. (Tetra Tech), and its subsidiaries. Any reuse of the SWP without Tetra Tech's permission is at the sole risk of the user. The user will hold harmless Tetra Tech for any damages that result from unauthorized reuse of this SWP. Authorized users are responsible for obtaining proper training and qualification from their employer before performing operations described in this SWP.

TABLE 1
HEAT STRESS CONDITIONS

Condition	Causes	Signs and Symptoms	Treatment
Heat cramps	Fluid loss and electrolyte imbalance from dehydration	<ul style="list-style-type: none">• Painful muscle cramps, especially in legs and abdomen• Faintness• Profuse perspiration	<ul style="list-style-type: none">• Move affected worker to cool location• Provide sips of liquid such as Gatorade®• Stretch cramped muscles• Transport affected worker to hospital if condition worsens
Heat Exhaustion	Blood transport to skin to dissipate excessive body heat, resulting in blood pooling in the skin with inadequate return to the heart	<ul style="list-style-type: none">• Weak pulse• Rapid and shallow breathing• General weakness• Pale, clammy skin• Profuse perspiration• Dizziness• Unconsciousness	<ul style="list-style-type: none">• Move affected worker to cool area• Remove as much clothing as possible• Provide sips of cool liquid or Gatorade® (only if conscious)• Fan the person but do not overcool or chill• Treat for shock• Transport to hospital if condition worsens
Heat Stroke	Life threatening condition from profound disturbance of body's heat-regulating mechanism	<ul style="list-style-type: none">• Dry, hot, and flushed skin• Constricted pupils• Early loss of consciousness• Rapid pulse• Deep breathing at first, and then shallow breathing• Muscle twitching leading to convulsions• Body temperature reaching 105 or 106 °F or higher	<ul style="list-style-type: none">• Immediately transport victim to medical facility• Move victim to cool area• Remove as much clothing as possible• Reduce body heat promptly by dousing with water or wrapping in wet cloth• Place ice packs under arms, around neck, at ankles, and wherever blood vessels are close to skin surface• Protect patient during convulsions

Disclaimer: This safe work practice (SWP) is the property of Tetra Tech, Inc. (Tetra Tech), and its subsidiaries. Any reuse of the SWP without Tetra Tech's permission is at the sole risk of the user. The user will hold harmless Tetra Tech for any damages that result from unauthorized reuse of this SWP. Authorized users are responsible for obtaining proper training and qualification from their employer before performing operations described in this SWP.

TABLE 2

SUGGESTED GUIDELINES WHEN WEARING PPE

Ambient Temperature	Maximum PPE Wearing Time per Excursion
Above 90 °F	15 minutes
85 to 90 °F	30 minutes
80 to 85 °F	60 minutes
70 to 80 °F	90 minutes
60 to 70 °F	120 minutes
50 to 60 °F	180 minutes

Source: National Institute for Occupational Safety and Health (NIOSH). 1985. Memorandum Regarding Recommended Personal Protective Equipment Wearing Times at Different Temperatures. From Austin Henschel. To Sheldon Rabinovitz. June 20.

Disclaimer: This safe work practice (SWP) is the property of Tetra Tech, Inc. (Tetra Tech), and its subsidiaries. Any reuse of the SWP without Tetra Tech's permission is at the sole risk of the user. The user will hold harmless Tetra Tech for any damages that result from unauthorized reuse of this SWP. Authorized users are responsible for obtaining proper training and qualification from their employer before performing operations described in this SWP.

To monitor the level of an employee's heat stress, the following should be measured:

- Heart Rate: Count the radial (wrist) pulse during a 30-second period as early as possible in the rest period; if heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.

If the heart rate still exceeds 110 beats per minute at the next period, shorten the following work cycle by one-third.

- Oral Temperature: Use a clinical thermometer (3 minutes under the tongue) to measure the oral temperature at the end of the work period. If oral temperature exceeds 99.6 °F (37.6 °C), shorten the next work cycle by one-third without changing the rest period. If oral temperature still exceeds 99.6 °F at the beginning of the next rest period, shorten the following work cycle by one-third. Do not permit a worker to wear impermeable PPE when his or her oral temperature exceeds 100.6 °F (38.1 °C).

Disclaimer: This safe work practice (SWP) is the property of Tetra Tech, Inc. (Tetra Tech), and its subsidiaries. Any reuse of the SWP without Tetra Tech's permission is at the sole risk of the user. The user will hold harmless Tetra Tech for any damages that result from unauthorized reuse of this SWP. Authorized users are responsible for obtaining proper training and qualification from their employer before performing operations described in this SWP.



TETRA TECH, INC.
HEALTH AND SAFETY MANUAL
VOLUME III

SAFE WORK PRACTICES (SWP)

USE OF HEAVY EQUIPMENT

SWP NO.: 6-26
ISSUE DATE: JULY 1998
REVISION: 1

Disclaimer: This safe work practice (SWP) is the property of Tetra Tech, Inc. (Tetra Tech), and its subsidiaries. Any reuse of the SWP without Tetra Tech's permission is at the sole risk of the user. The user will hold harmless Tetra Tech for any damages that result from unauthorized reuse of this SWP. Authorized users are responsible for obtaining proper training and qualification from their employer before performing operations described in this SWP.

swp6-26_use_of_heavy_equipment

USE OF HEAVY EQUIPMENT

Truck-mounted heavy equipment and field trucks are among the types of equipment that may be used during field work. Heavy equipment can present a substantial hazard to workers. General requirements for motor vehicles and material-handling equipment are provided in the Occupational Safety and Health Administration (OSHA) Construction Industry Standards, 29 CFR 1926, Subpart O. The following precautions will be followed when heavy equipment (such as drill rigs, front-end loaders, and backhoes) is in use:

- Heavy equipment will be inspected by the operator before each work shift. The site safety coordinator (SSC) will ensure compliance with these precautions
- Equipment operators will be instructed to report any abnormalities, such as equipment failure, oozing liquids, and unusual odors, to their supervisors or the SSC
- Only qualified and licensed personnel will operate heavy equipment
- Hard hats, steel-toed boots, and safety glasses or goggles will be worn at all times around heavy equipment. Other personal protective equipment (PPE) specified in the site health and safety plan (HASP) will also be required
- Workers will not assume that the equipment operator is keeping track of their exact location. Workers will never walk directly behind or to the side of heavy equipment without the operator's knowledge
- Workers in close proximity to heavy equipment will maintain visual contact with equipment operators at all times
- When an operator must maneuver equipment in tight quarters, the presence of a second person will be required to ensure adequate clearance. If backing is required, two ground guides will be used: one in the direction the equipment is moving, and the other in the operators's normal field of vision to relay signals
- All heavy equipment used at a contaminated work site will be kept in the exclusion zone until the work has been completed. Such equipment will then be decontaminated within the designated decontamination area
- Hand-signal communications will be established when verbal communication is difficult. One person per work team will be designated to give hand signals to equipment operators
- Equipment with an obstructed rear view must have an audible alarm that sounds when the equipment is moving in reverse (unless a spotter guides the operator)

Disclaimer: This safe work practice (SWP) is the property of Tetra Tech, Inc. (Tetra Tech), and its subsidiaries. Any reuse of the SWP without Tetra Tech's permission is at the sole risk of the user. The user will hold harmless Tetra Tech for any damages that result from unauthorized reuse of this SWP. Authorized users are responsible for obtaining proper training and qualification from their employer before performing operations described in this SWP.

- Parking brakes will be kept engaged when equipment is not in use
- Blades, buckets, dump bodies, and other hydraulic systems will be kept fully lowered when equipment is not in use
- Equipment cabs will be kept free of all nonessential and loose items
- Seat belts must be present in all vehicles having a rollover protective structure (ROPS)
- With certain exceptions, all material-handling equipment must be equipped with ROPS
- Material-handling equipment that lacks a ROPS will not be operated on a grade unless the grade can safely accommodate the equipment involved
- Drilling auger sections and other equipment are extremely heavy. All precautions must be taken before moving heavy equipment. Appropriate equipment must be used to transport heavy equipment
- Only chains, hoists, straps, and other equipment that safely aids transport of heavy materials will be used
- Proper personal lifting techniques will be used. Workers will lift using their legs, not their backs
- A safety barrier will be used to protect workers when tires are inflated, removed, or installed on split rims
- An ongoing maintenance program for all tools and equipment must be in place. All tools and moving equipment will be inspected regularly to ensure that parts are secured, are intact, and have no cracks or areas of weakness. The equipment must turn smoothly without wobbling and must operate according to manufacturer specifications. Defective items will be promptly repaired or replaced. Maintenance and repair logs will be kept
- Tools will be stored in clean, secure areas to prevent damage, loss, or theft
- Workers will not use equipment with which they are not familiar. This precaution applies to heavy as well as light equipment
- Loose-fitting clothing and loose, long hair will be prohibited around moving machinery
- Workers will make sure that no underground or overhead power lines, sewer lines, gas lines, or telephone lines present a hazard in the work area
- All personnel who are not essential to work activities will be kept out of the work area

Disclaimer: This safe work practice (SWP) is the property of Tetra Tech, Inc. (Tetra Tech), and its subsidiaries. Any reuse of the SWP without Tetra Tech's permission is at the sole risk of the user. The user will hold harmless Tetra Tech for any damages that result from unauthorized reuse of this SWP. Authorized users are responsible for obtaining proper training and qualification from their employer before performing operations described in this SWP.

- Workers will be aware of their footing at all times
- Workers will remain alert at all times

Disclaimer: This safe work practice (SWP) is the property of Tetra Tech, Inc. (Tetra Tech), and its subsidiaries. Any reuse of the SWP without Tetra Tech's permission is at the sole risk of the user. The user will hold harmless Tetra Tech for any damages that result from unauthorized reuse of this SWP. Authorized users are responsible for obtaining proper training and qualification from their employer before performing operations described in this SWP.



TETRA TECH, INC.
HEALTH AND SAFETY MANUAL
VOLUME III

SAFE WORK PRACTICES (SWP)

RESPIRATOR CLEANING PROCEDURES

SWP NO.: 6-27
ISSUE DATE: FEBRUARY 1999
REVISION: 0

Disclaimer: This safe work practice (SWP) is the property of Tetra Tech, Inc. (Tetra Tech), and its subsidiaries. Any reuse of the SWP without Tetra Tech's permission is at the sole risk of the user. The user will hold harmless Tetra Tech for any damages that result from unauthorized reuse of this SWP. Authorized users are responsible for obtaining proper training and qualification from their employer before performing operations described in this SWP.

swp6-27_respirator_cleaning_practices

RESPIRATOR CLEANING PROCEDURES

This safe work practice (SWP) provides guidelines for proper and thorough cleaning of respiratory protection equipment. The Occupational Safety and Health Administration (OSHA) regulates the use of respiratory protection for general industry in Title 29 of the *Code of Federal Regulations* (CFR) Part 1910.134, "Respiratory Protection." Appendix B-2 of the standard outlines mandatory requirements for respirator cleaning and is used as the basis for this SWP. This SWP supplements Document Control No. 2-6, "Respiratory Protection Program." It provides specific respirator cleaning and disinfection procedures and shall be included as an attachment to the site-specific health and safety plan for projects for which respirator use is planned or is a contingency.

1.0 APPLICABILITY

This SWP shall apply to any project that involves use of respirators with reusable facepieces.

Respirators shall be cleaned and disinfected as discussed below.

- Respirators issued for the exclusive use of an employee shall be cleaned and disinfected as often as necessary to be maintained in a sanitary condition.
- Respirators issued to more than one employee shall be cleaned and disinfected before being worn by different individuals.
- Respirators maintained for emergency use shall be cleaned and disinfected after each use.
- Respirators used in fit testing and training shall be cleaned and disinfected after each use.

2.0 CLEANING AND DISINFECTION PROCEDURES

Mandatory respirator cleaning procedures as defined in 29 CFR Part 1910.134, Appendix B-2, are listed below. All wash and rinse water should be warm, with a maximum temperature of 110 °F (43 °C).

1. Remove filters, cartridges, or canisters. Disassemble facepieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, and any other components as recommended by the manufacturer. Discard or repair any defective parts.

Disclaimer: This safe work practice (SWP) is the property of Tetra Tech, Inc. (Tetra Tech), and its subsidiaries. Any reuse of the SWP without Tetra Tech's permission is at the sole risk of the user. The user will hold harmless Tetra Tech for any damages that result from unauthorized reuse of this SWP. Authorized users are responsible for obtaining proper training and qualification from their employer before performing operations described in this SWP.

2. Wash components in warm water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.
3. Rinse components thoroughly in clean, warm, preferably running water. Drain all components.
4. When the cleaner does not contain a disinfecting agent, respirator components should be immersed for 2 minutes in one of the following:
 - Hypochlorite solution [50 parts per million (ppm) of chlorine] made by adding approximately one milliliter of laundry bleach to 1 liter of warm water
 - Aqueous solution of iodine [50 ppm iodine made by adding approximately 0.8 milliliter of tincture of iodine (6 to 8 grams ammonium and/or potassium iodide per 100 cubic centimeters of 45 percent alcohol) to 1 liter of warm water]
 - Other commercially available cleansers of equivalent disinfectant quality when used as directed if their use is recommended or approved by the respirator manufacturer
5. Rinse components thoroughly in clean, warm, preferably running water. Drain all components. The importance of thorough rinsing cannot be over emphasized. Detergents or disinfectants that dry on facepieces may cause dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.
6. Components should be air-dried or hand-dried with a clean, lint-free cloth.
7. Reassemble the facepiece. Replace filters, cartridges, and canisters prior to next use.
8. Test the respirator to ensure that all components work properly.
9. Place the respirator in a clean bag and seal for storage.

Depending on work conditions, respirator facial sealing surfaces may need periodic cleaning during the course of daily use. Cleaning of the facial sealing surface during work breaks can reduce the chance of facial irritation caused by sweat, natural skin oil, or irritating materials that may have deposited on the facepiece. Facial sealing surfaces can be cleaned using disinfectant wipes soaked in isopropyl alcohol or benzalkonium chloride. After use of the disinfectant wipe, the sealing surface should air dry or be dried thoroughly using paper towels or tissues.

Disclaimer: This safe work practice (SWP) is the property of Tetra Tech, Inc. (Tetra Tech), and its subsidiaries. Any reuse of the SWP without Tetra Tech's permission is at the sole risk of the user. The user will hold harmless Tetra Tech for any damages that result from unauthorized reuse of this SWP. Authorized users are responsible for obtaining proper training and qualification from their employer before performing operations described in this SWP.



TETRA TECH, INC.
HEALTH AND SAFETY MANUAL
VOLUME III

SAFE WORK PRACTICES (SWP)

SAFE WORK PRACTICES FOR USE OF AIR PURIFYING RESPIRATORS

SWP NO.: 6-28

ISSUE DATE: FEBRUARY 1999

REVISION: 0

Disclaimer: This safe work practice (SWP) is the property of Tetra Tech, Inc. (Tetra Tech), and its subsidiaries. Any reuse of the SWP without Tetra Tech's permission is at the sole risk of the user. The user will hold harmless Tetra Tech for any damages that result from unauthorized reuse of this SWP. Authorized users are responsible for obtaining proper training and qualification from their employer before performing operations described in this SWP.

swp6-28_safe_use_practices_for_use_of_respirators

SAFE WORK PRACTICES FOR USE OF RESPIRATORS

This safe work practice (SWP) was developed to ensure the proper use of respirators in routine and foreseeable emergency situations. The SWP supplements Document Control No. 2-6, "Respiratory Protection Program." This SWP shall be included as an attachment to the site-specific health and safety plan (HASP) for projects for which respirator use is planned or is a contingency.

1.0 APPLICABILITY

This SWP shall apply to any project that involves use of air purifying respirators and shall not be used for situations involving the use of supplied air systems such as self-contained breathing apparatuses and air-line apparatuses.

2.0 ROUTINE RESPIRATOR USE PROCEDURES

The procedures below apply to the routine use of air purifying respirators.

- Respirators shall not be issued to or worn by individuals when conditions prevent valve function or a good facial seal. These conditions may include but are not limited to facial hair, such as the growth of beard, sideburns, or excessive mustaches, and possibly the wearing of corrective eyeglasses.
- If spectacles, goggles, face shields, or welding helmets must be worn with a facepiece, they will be worn so as not to adversely affect the seal of the facepiece to the face.
- For all tight-fitting respirators, a positive and negative pressure seal check shall be performed each time the respirator is donned. Seal checks shall be performed as follow:
 - *Negative pressure check:* Close off the inlet opening of the canister or cartridge(s) by covering it with the palm of the hand(s), inhale gently so that the facepiece collapses slightly, and hold the breath for 10 seconds. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is satisfactory.
 - *Positive pressure check:* Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. The exhalation valve cover may have to be removed to perform this procedure.

Disclaimer: This safe work practice (SWP) is the property of Tetra Tech, Inc. (Tetra Tech), and its subsidiaries. Any reuse of the SWP without Tetra Tech's permission is at the sole risk of the user. The user will hold harmless Tetra Tech for any damages that result from unauthorized reuse of this SWP. Authorized users are responsible for obtaining proper training and qualification from their employer before performing operations described in this SWP.

- *Manufacturer's recommended seal check:* If the respirator manufacturer recommends specific procedures for performing a user seal check, these procedures may be used instead of the negative and positive pressure checks.
- Work areas must be monitored for conditions that may adversely affect the effectiveness of respiratory protection. Employees may leave the work area where respirators are required under the following conditions:
 - To wash the face and respirator facepieces as necessary to prevent eye or skin irritation
 - If vapor or gas breakthrough, changes in breathing resistance, or leakage of the facepiece is detected
 - To replace the respirator or the filter, cartridge, or canister elements
 - If established monitoring instrument action levels are exceeded
 - For any other criteria as established in a project specific health and safety plan

3.0 RESPIRATOR USE DURING EMERGENCY SITUATIONS

Emergency situations may arise during the wearing of respiratory protection. These situations could include medical emergency, respirator failure, fire, chemical spills or leaks, and other events that pose an immediate risk. Procedures for respirator use during emergency situations are summarized below.

- When an emergency situation arises that creates or has the potential to create immediately dangerous to life and health (IDLH) conditions, the work environment shall be evacuated immediately and shall not be reentered by employees without suitable protective gear.
- Work environments with the potential for the development of atmospheres that may present IDLH conditions shall only be entered by employees using the buddy system.
- When an emergency situation arises that includes physical hazards that may interfere with the proper use of respiratory protection, the work environment shall be evacuated.
- Under no circumstances shall respirator users remove facepieces in hazardous atmospheres. In the event of respirator malfunction, users should leave the hazardous environment immediately and proceed to a known safe location before removal of the facepiece.

Disclaimer: This safe work practice (SWP) is the property of Tetra Tech, Inc. (Tetra Tech), and its subsidiaries. Any reuse of the SWP without Tetra Tech's permission is at the sole risk of the user. The user will hold harmless Tetra Tech for any damages that result from unauthorized reuse of this SWP. Authorized users are responsible for obtaining proper training and qualification from their employer before performing operations described in this SWP.

- Episodes of respirator failure shall be thoroughly investigated before work activities begin again. The investigation shall include re-evaluation of work area atmospheric conditions, review of the respirator selection criteria and service life calculations, and an evaluation of the working conditions under which respirator failure occurred.

Disclaimer: This safe work practice (SWP) is the property of Tetra Tech, Inc. (Tetra Tech), and its subsidiaries. Any reuse of the SWP without Tetra Tech's permission is at the sole risk of the user. The user will hold harmless Tetra Tech for any damages that result from unauthorized reuse of this SWP. Authorized users are responsible for obtaining proper training and qualification from their employer before performing operations described in this SWP.

APPENDIX C

RESPIRATORY HAZARD ASSESSMENT (FORM RP-2)

Note: Since P-100 respirator cartridges are being used on the site, Form RP-2 is not required. Employees wearing respiratory protection will change respirator cartridges at a minimum at the end of each work-shift. If breathing through P-100 cartridges becomes difficult, they shall be replaced immediately.